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Garfinkle et al.

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[54] **METHOD OF PROCESSING DIGITAL IMAGES AND DISTRIBUTING VISUAL PRINTS PRODUCED FROM THE DIGITAL IMAGES**

[75] **Inventors:** Philip N. Garfinkle, Herndon, Va.;
 Yaacov Ben Yaacov, Jerusalem; Elliot
 D. Jaffe, Hashmonaem, both of Israel

[73] **Assignee:** PictureVision, Inc., Herndon, Va.

[*] **Notice:** This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

4,862,222	8/1989	Staudé et al.	355/40
4,918,484	4/1990	Ujiie et al.	355/41
4,935,809	6/1990	Hayashi et al.	358/76
4,951,086	8/1990	Hicks	355/41
4,974,096	11/1990	Wash	358/302
5,023,655	6/1991	Hicks	355/39
5,070,677	12/1991	Hicks	53/435
5,072,254	12/1991	Hicks et al.	355/50
5,072,256	12/1991	Hicks	355/71
5,093,682	3/1992	Hicks	355/1
5,097,292	3/1992	Hicks	355/75
5,319,401	6/1994	Hicks	354/76
5,321,465	6/1994	Hicks	355/77
5,512,396	4/1996	Hicks	430/21

Primary Examiner—Safet Metjahic

Assistant Examiner—Michael Dalakis

[57] **ABSTRACT**

This invention is directed to a method of processing at least one digital image of at least one photographic image and distributing at least one visual print produced from the at least one digital image. The method includes the steps of storing at least one digital image of at least one photographic image on at least one image server at a first location. Selective authorized access to the at least one digital image of the at least one photographic image from a second location is then facilitated. Orders are received for at least one visual print of the at least one photographic image from the second location. Based upon the orders at least one visual image is produced from the stored digital image at the first location in response to the at least one order.

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[51] **Int. Cl.⁷** G03F 3/10; H04N 1/04

[52] **U.S. Cl.** 396/639; 395/226; 395/227;
 355/40

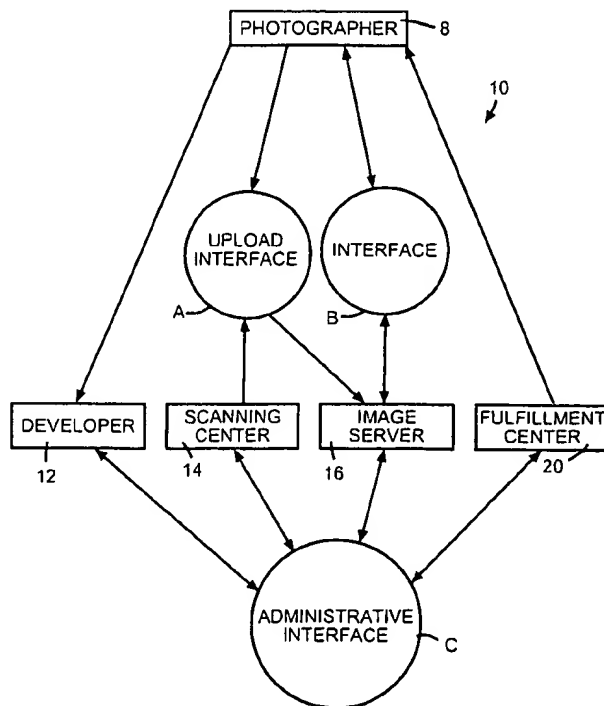
[58] **Field of Search** 395/226, 227,
 395/230, 234; 355/40, 41, 72, 77; 396/4-29,
 638-639

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,417,811	11/1983	Hamer	355/77
4,432,637	2/1984	Baschung	355/35
4,862,200	8/1989	Hicks	354/75

38 Claims, 18 Drawing Sheets



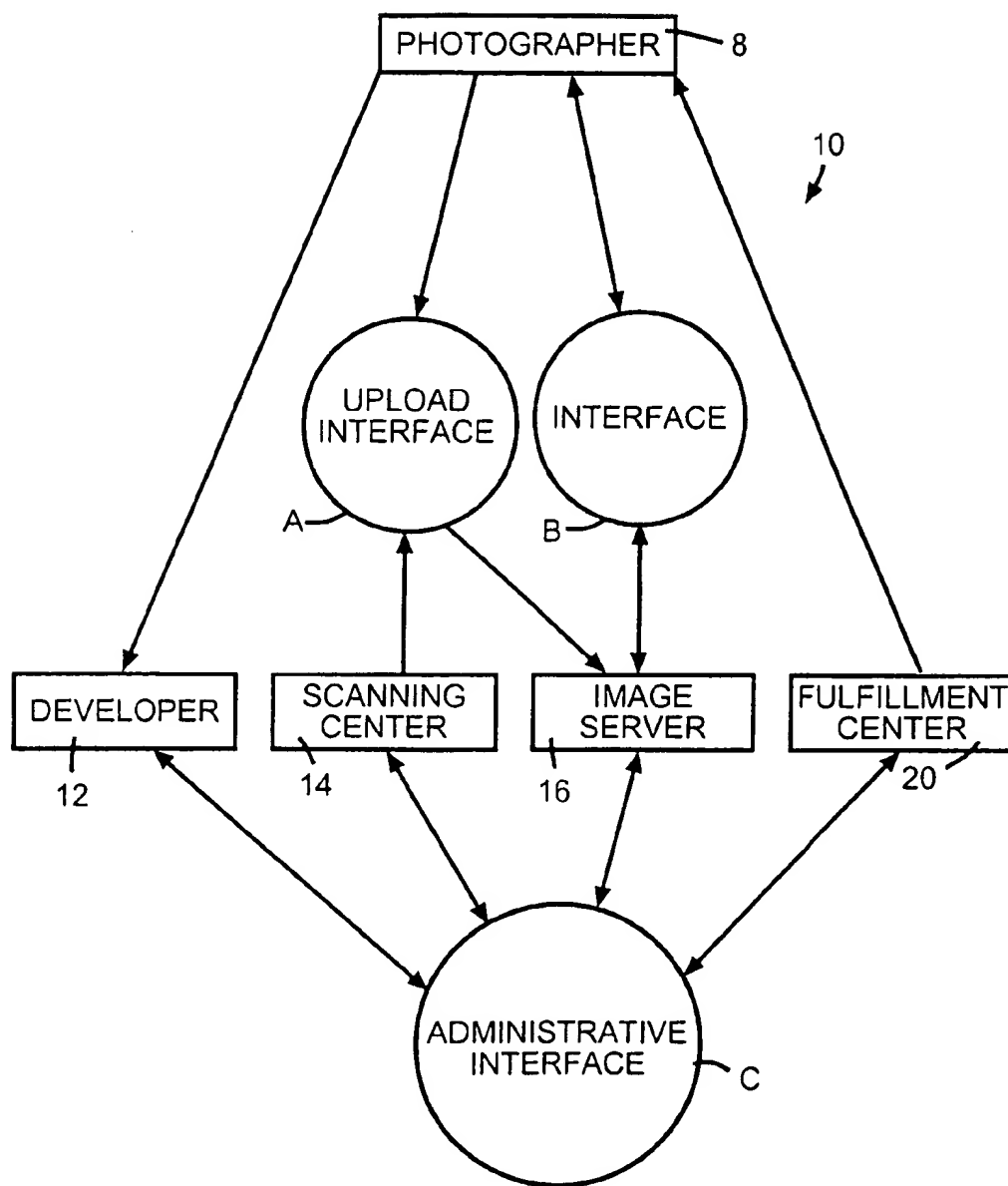
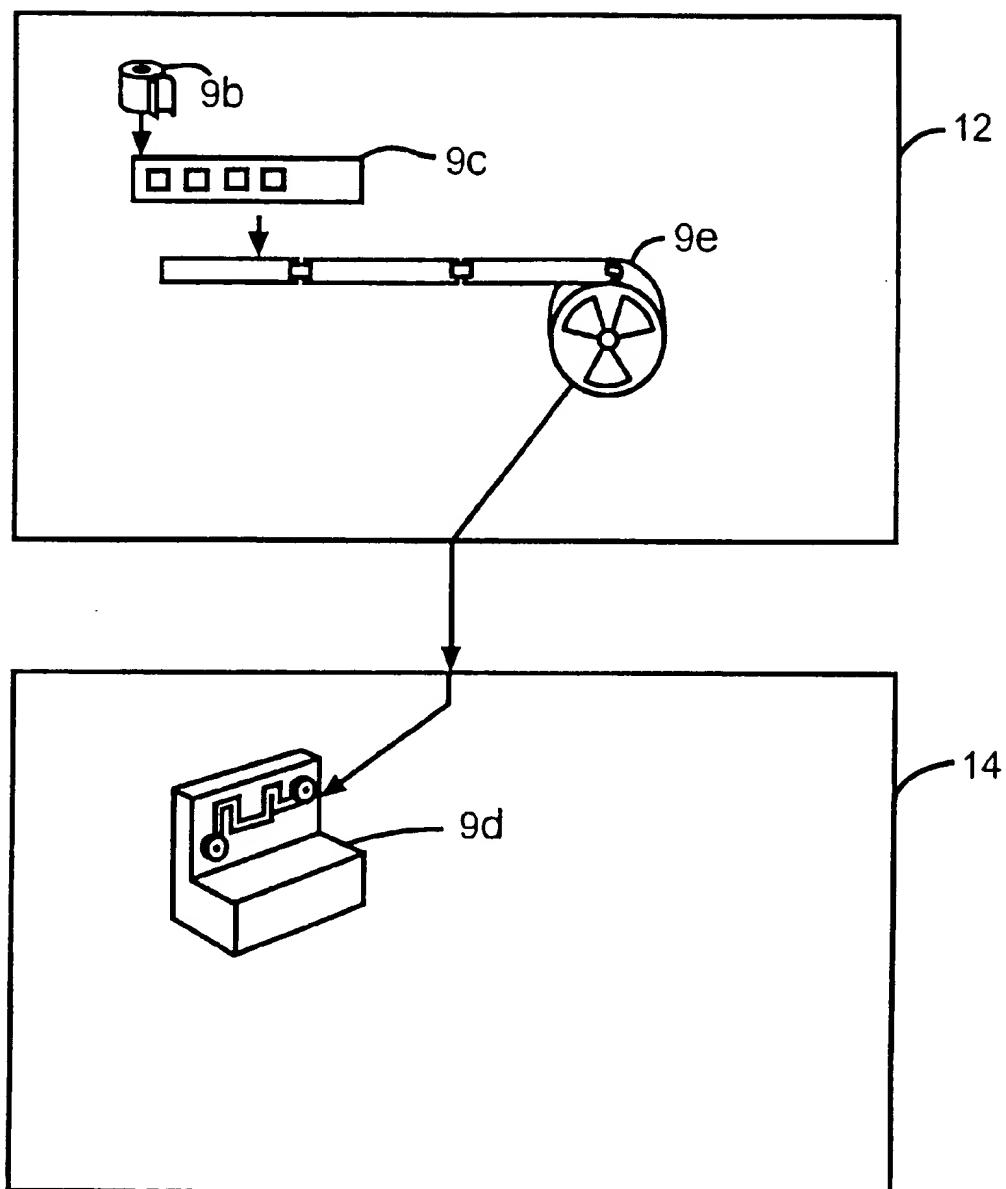


FIG. 1



—FIG. 2

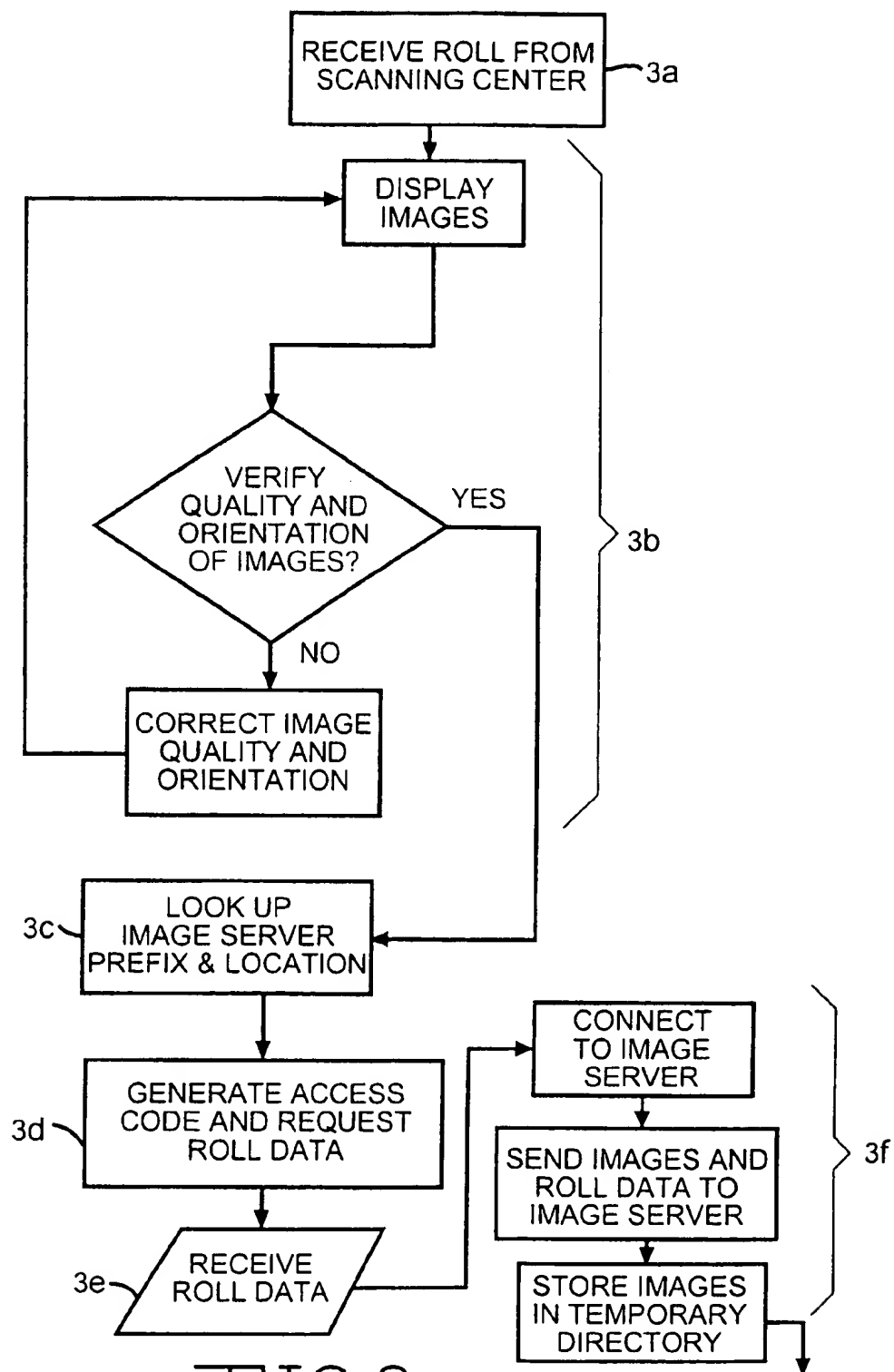
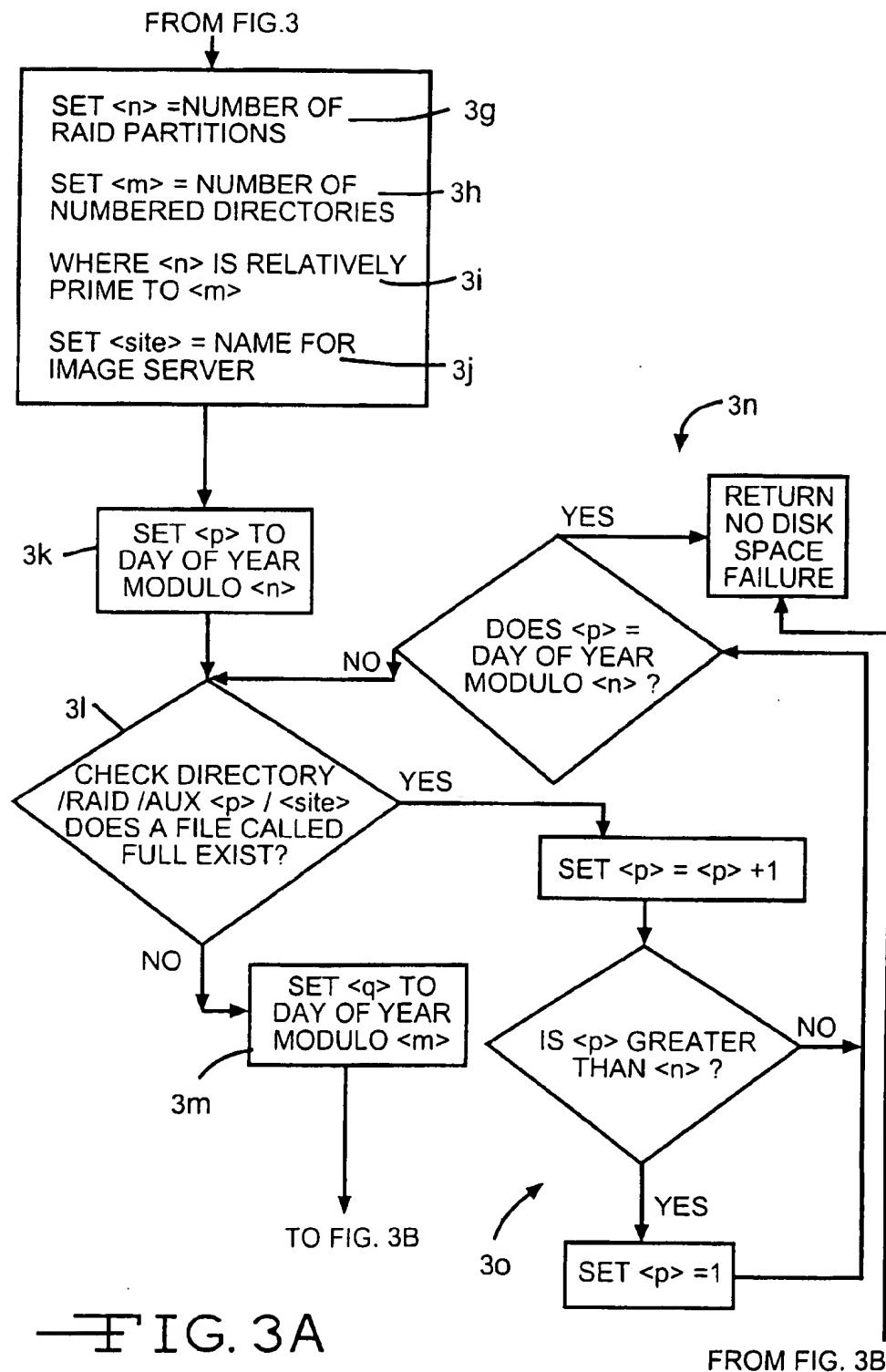
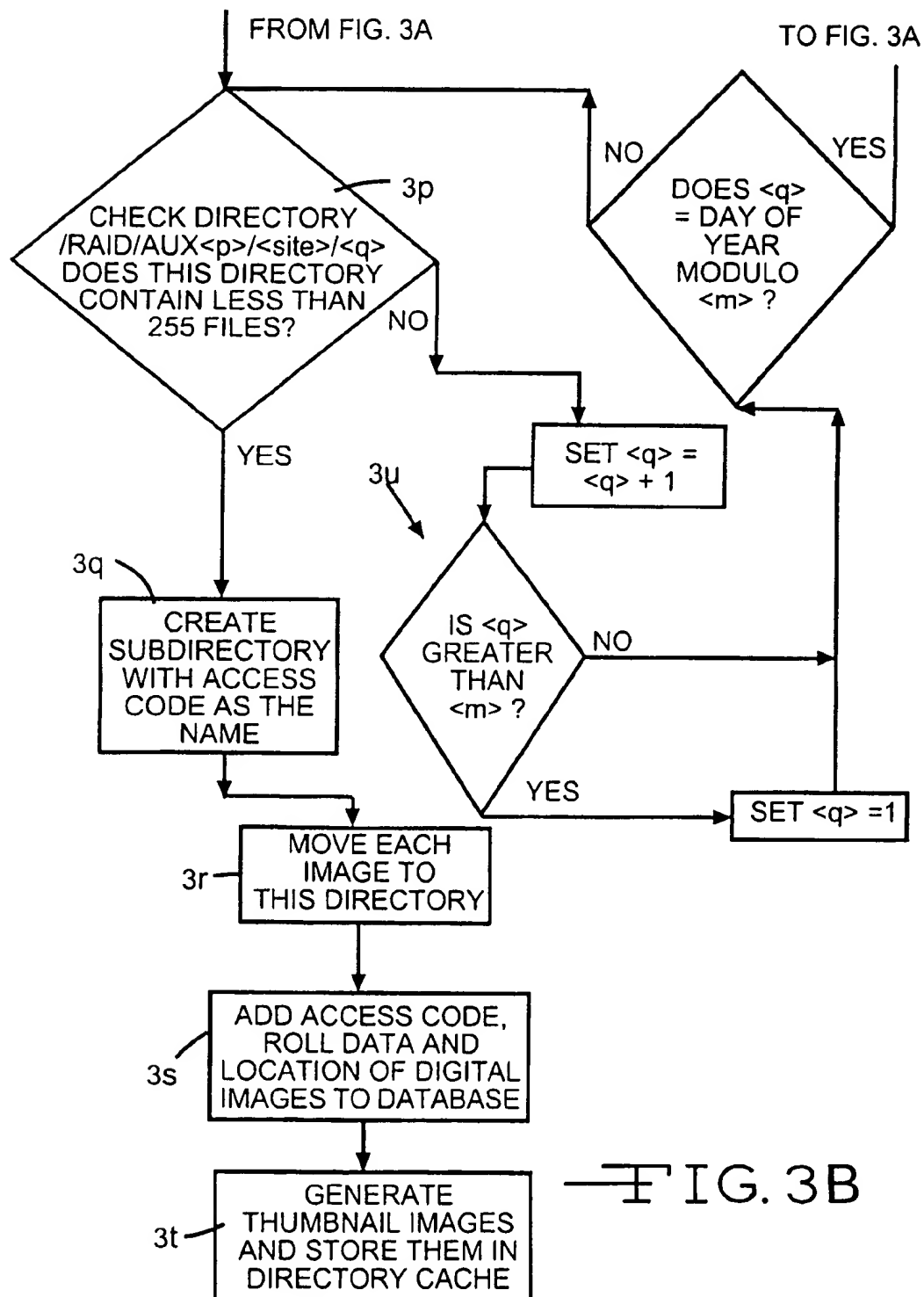
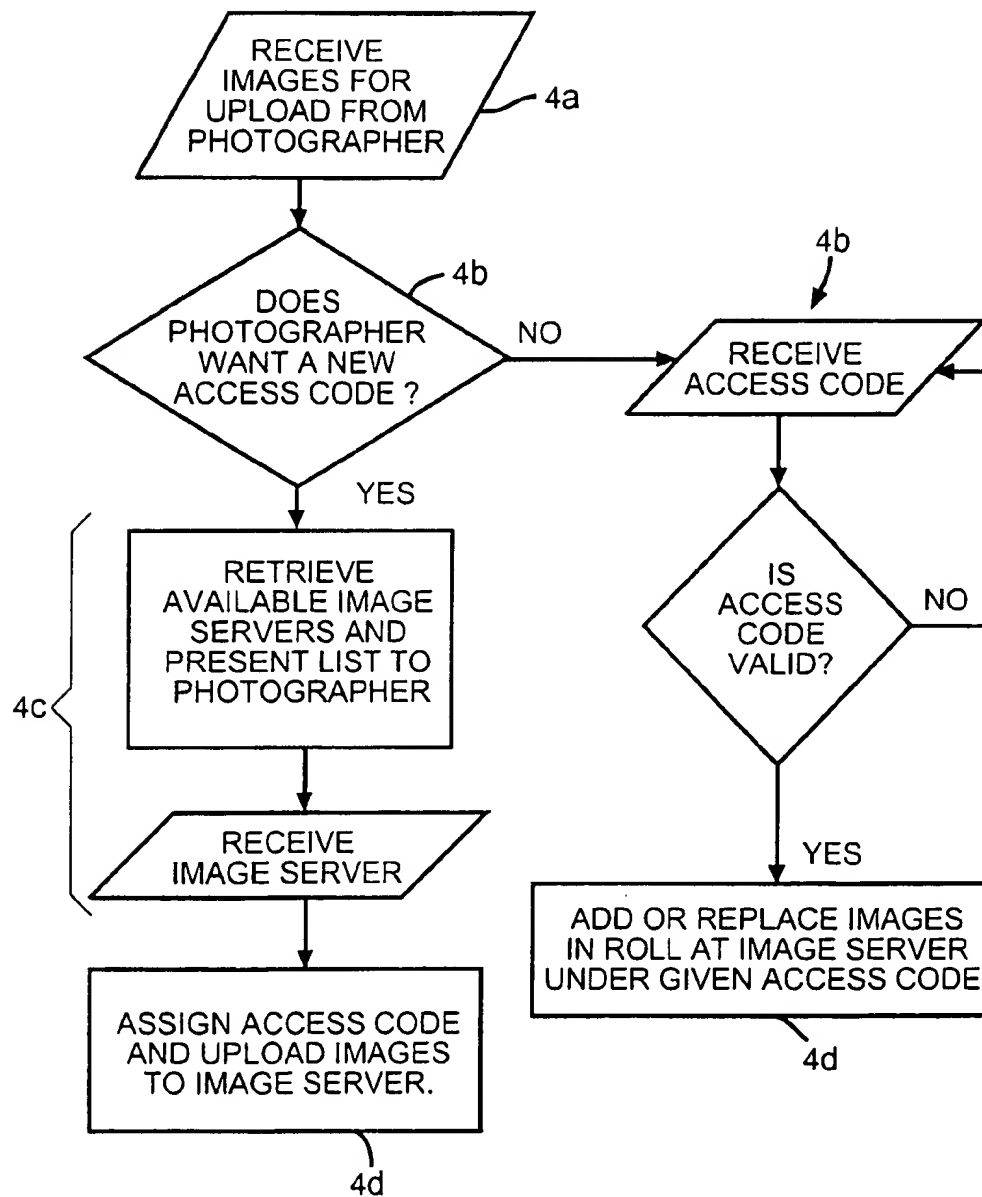


FIG. 3







—FIG. 4

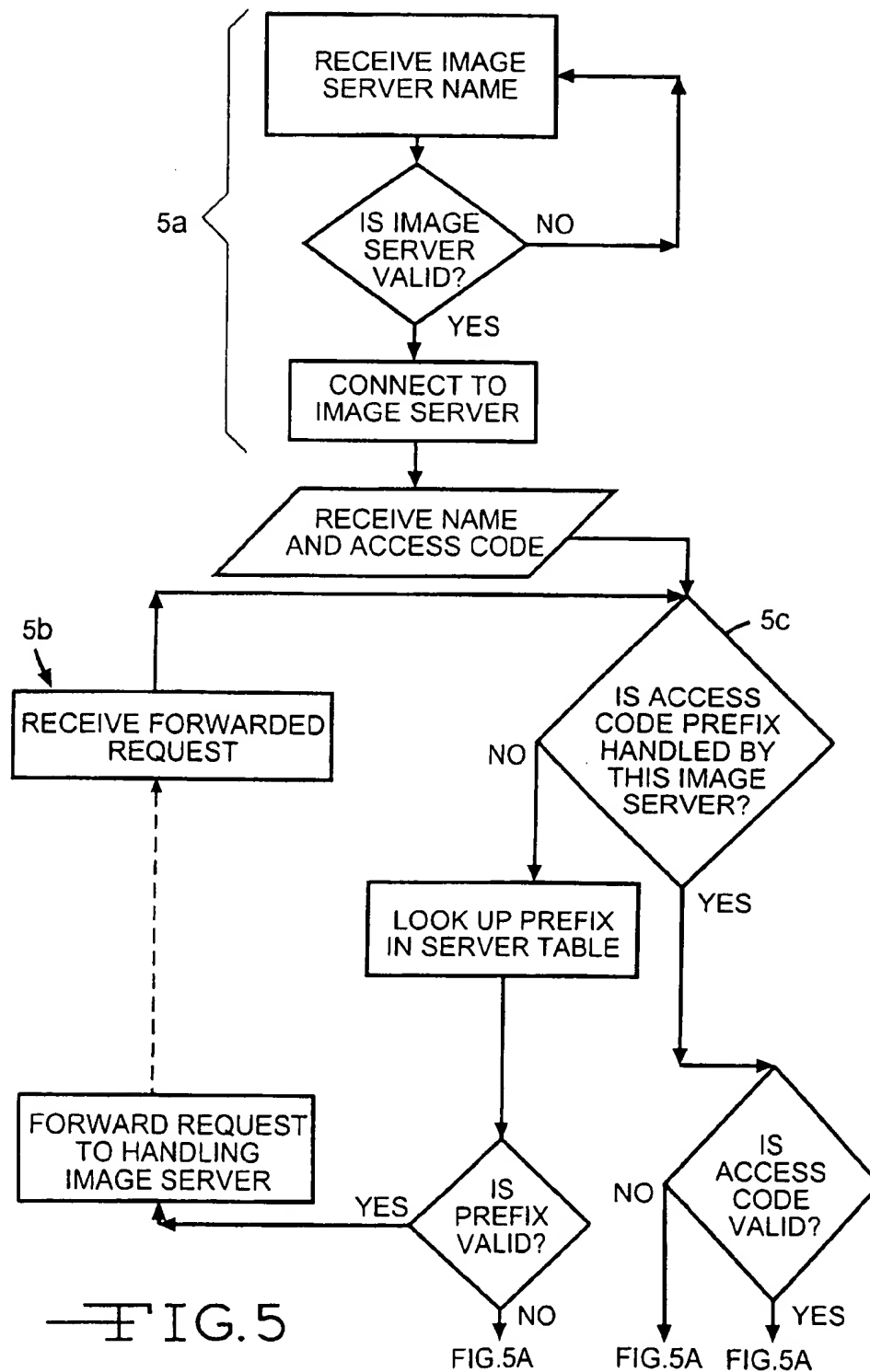


FIG. 5

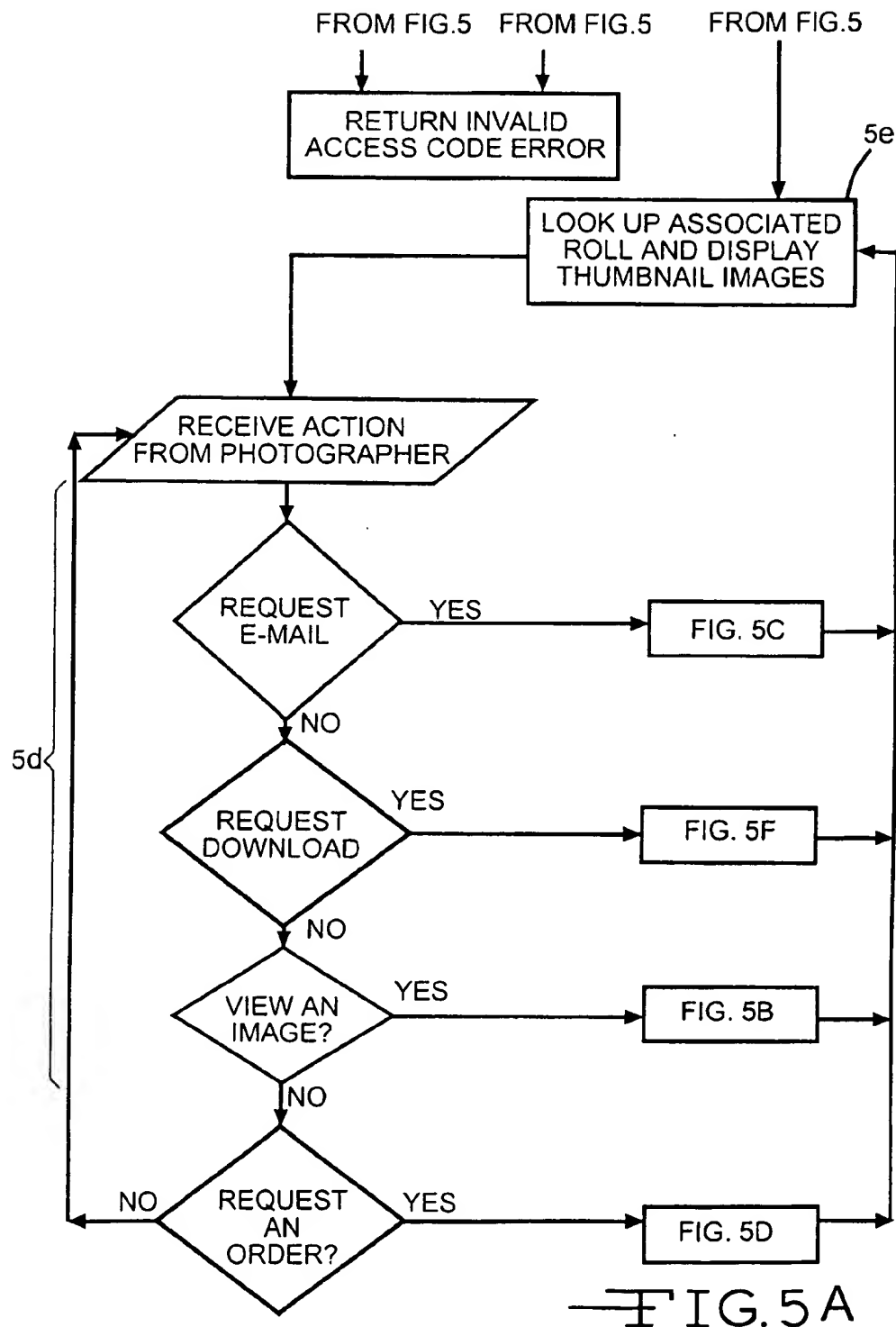
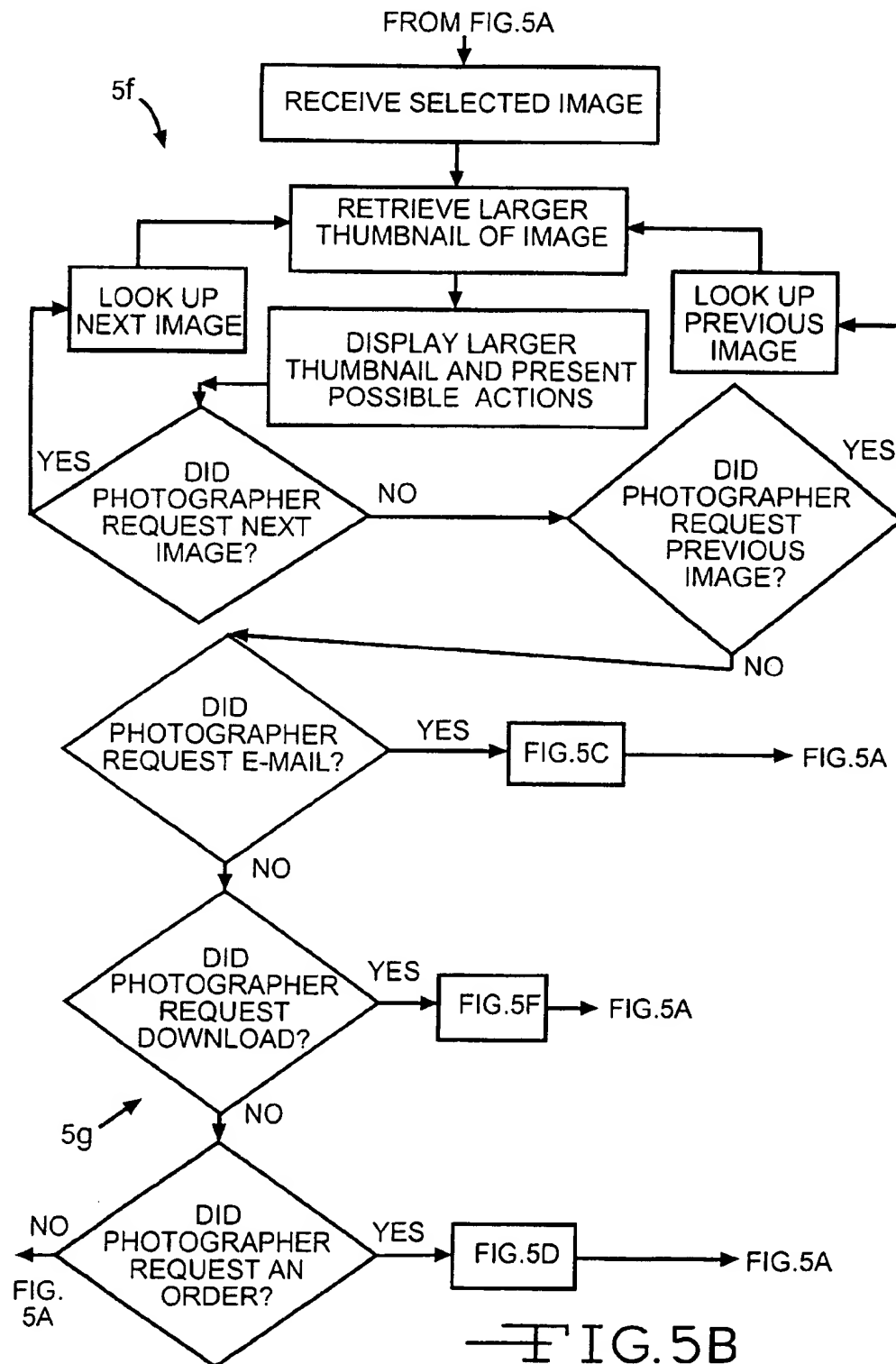


FIG. 5A



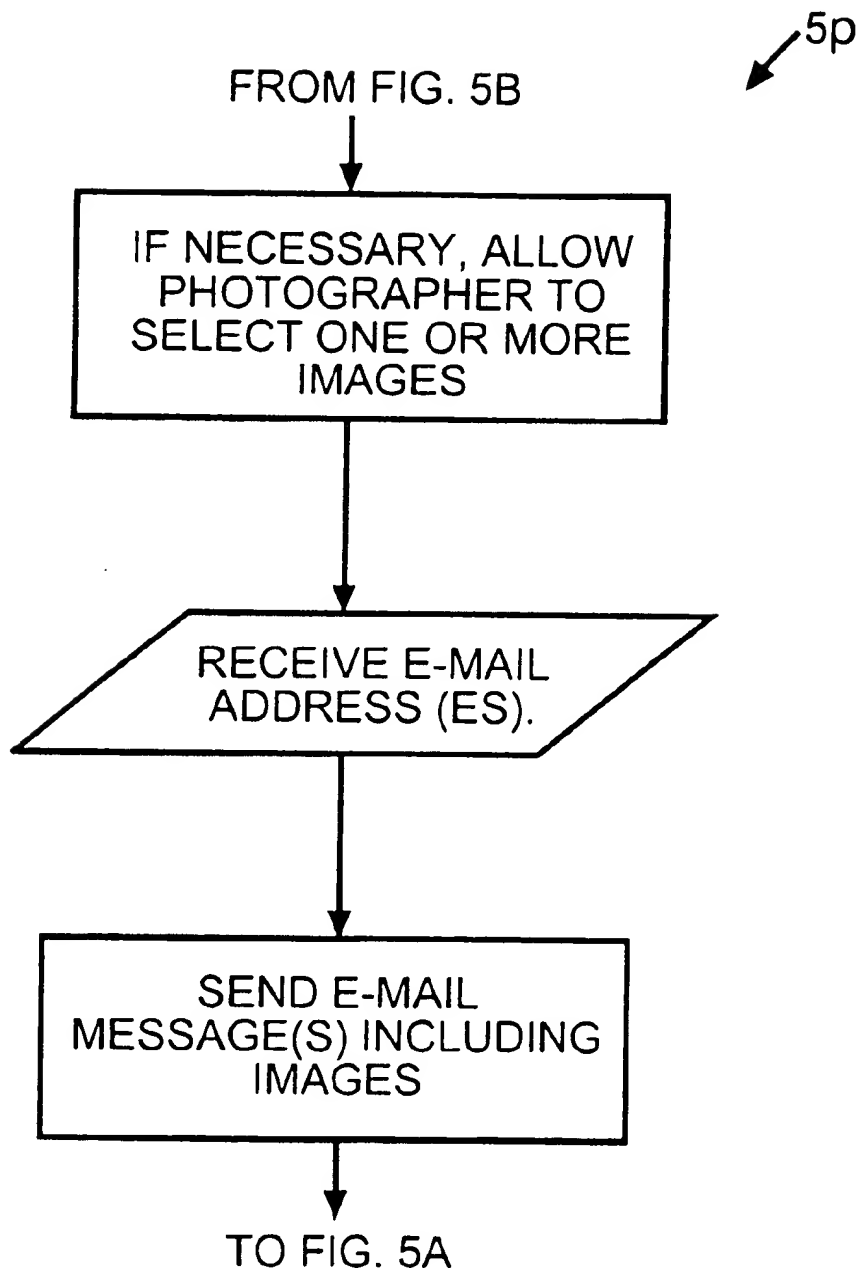


FIG. 5C

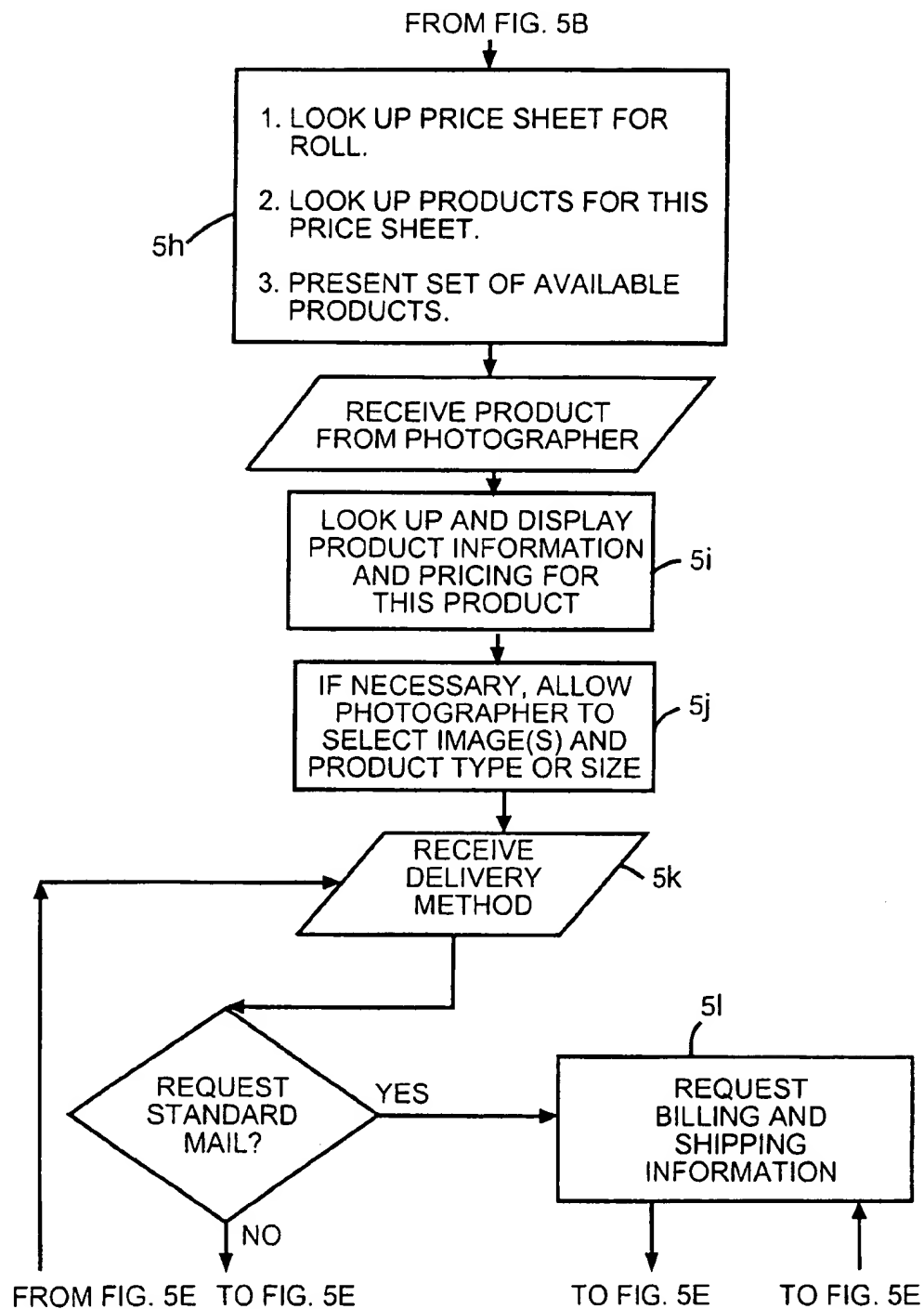


FIG. 5D

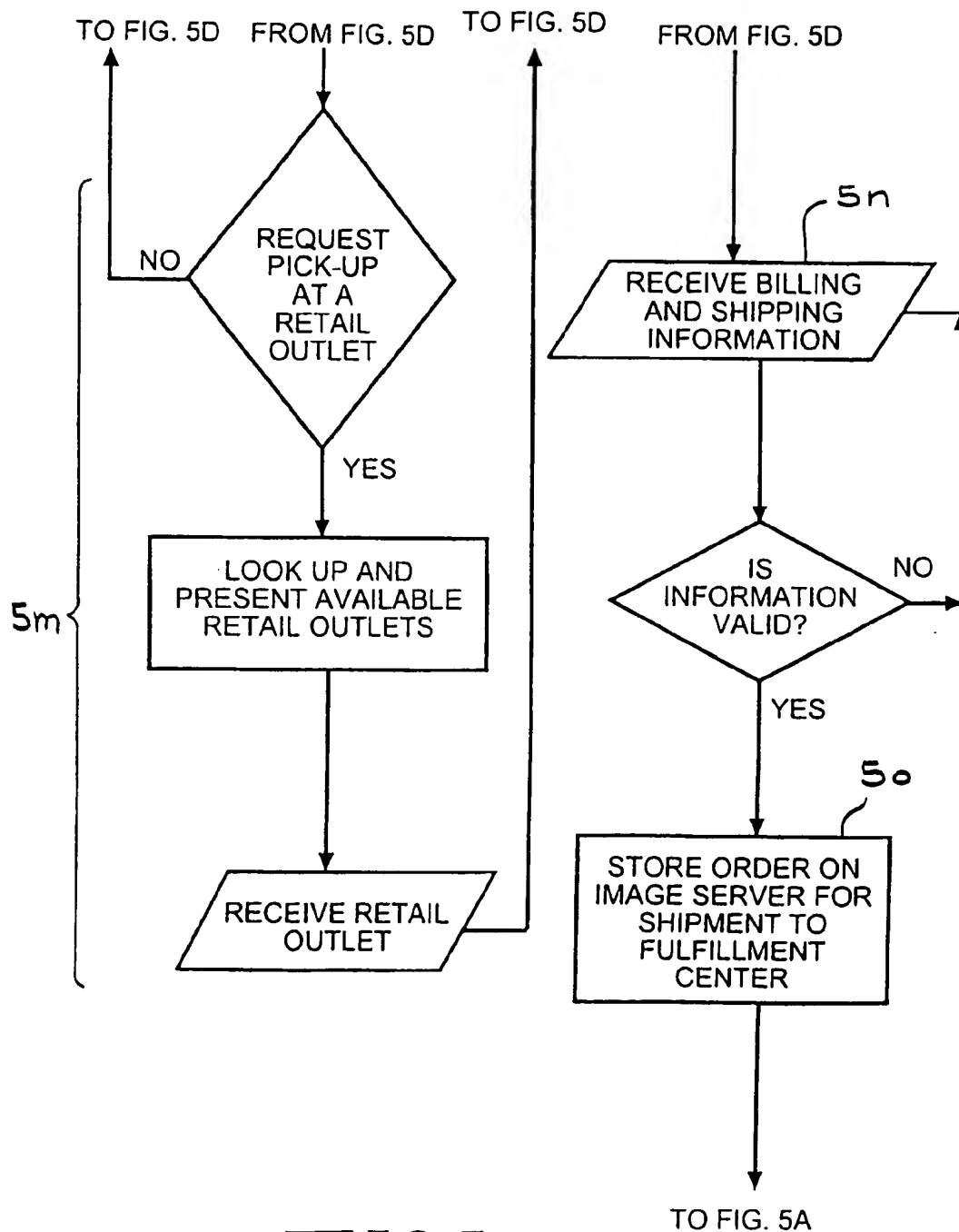


FIG. 5E

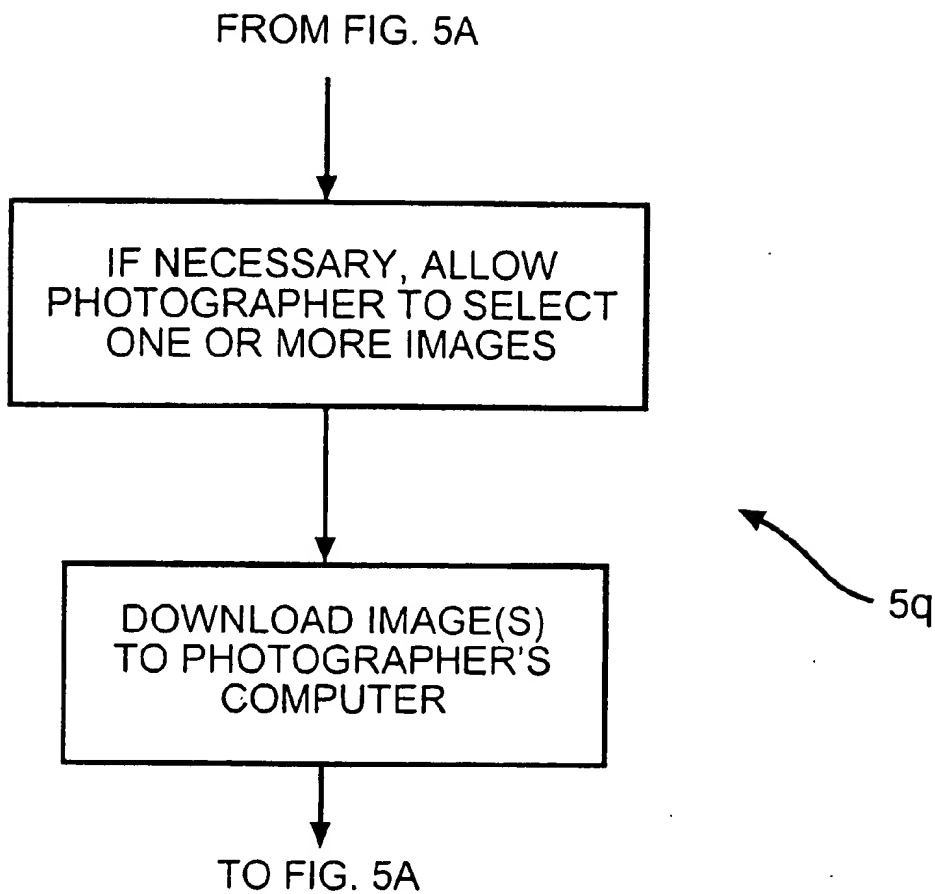


FIG. 5F

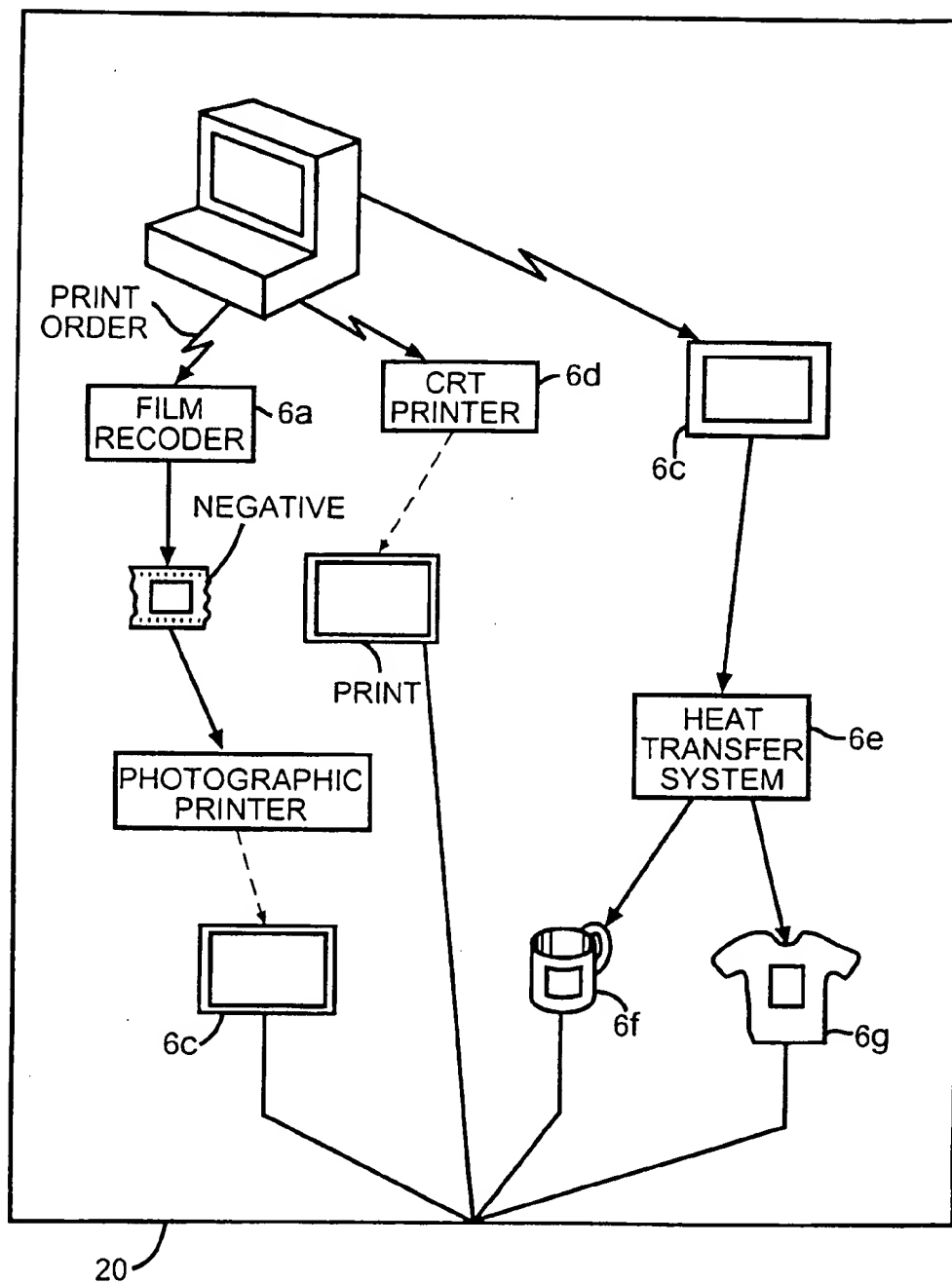
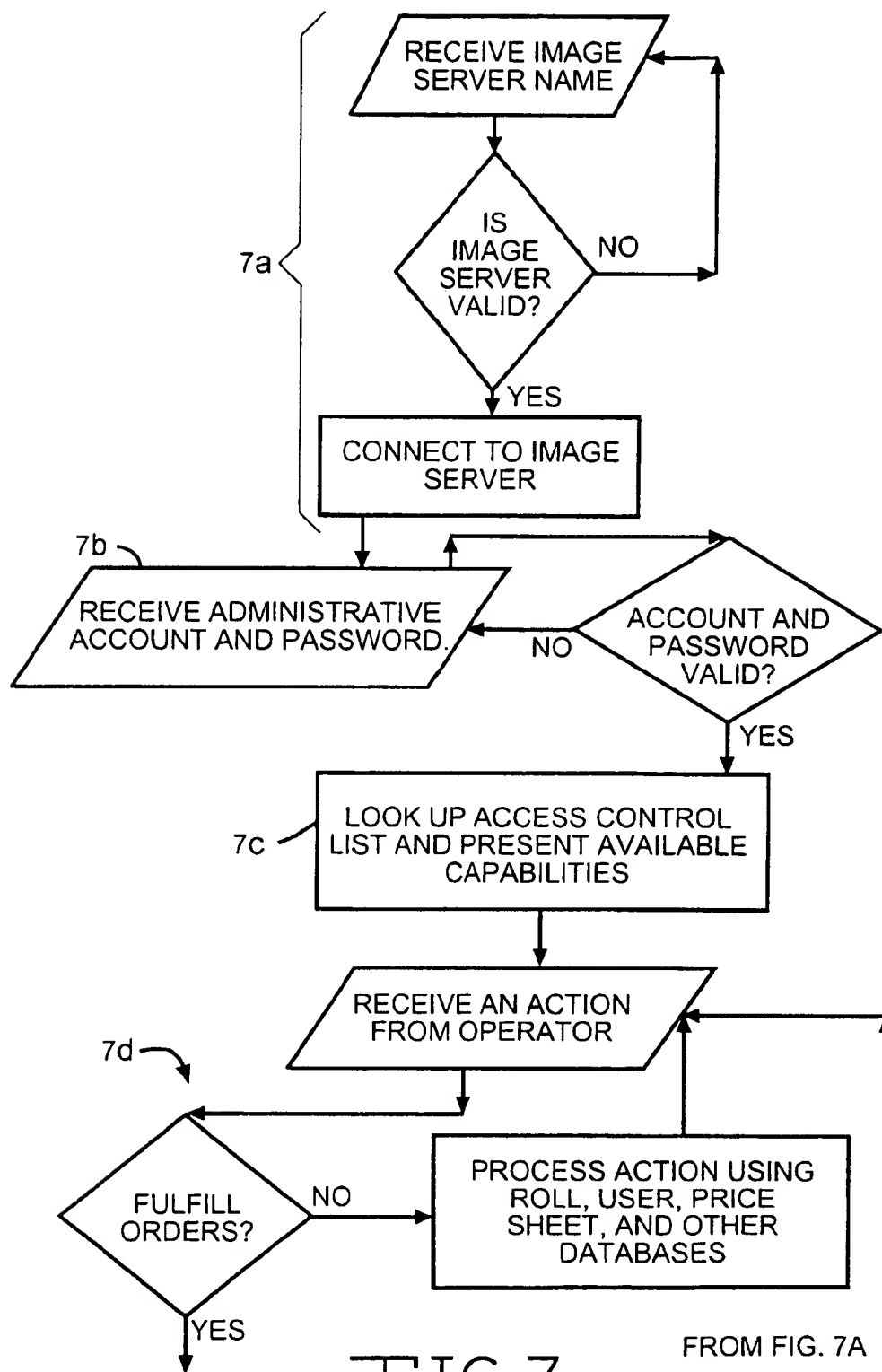


FIG. 6



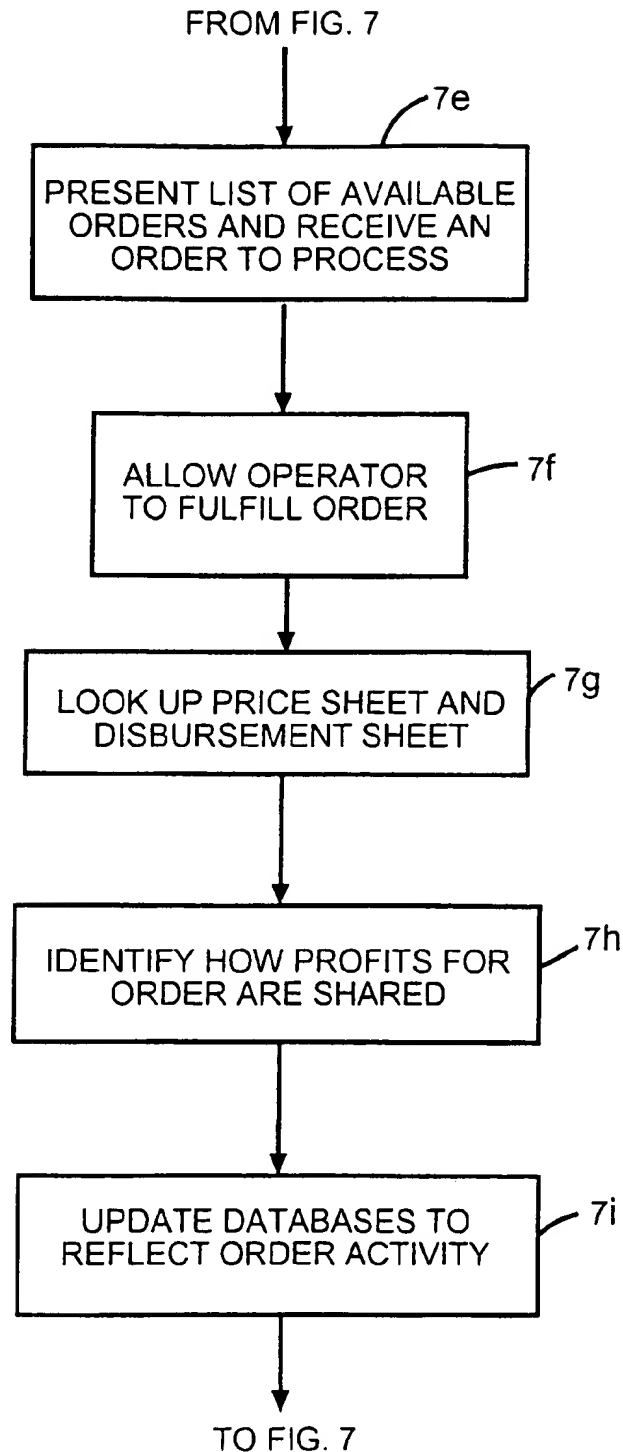


FIG. 7A

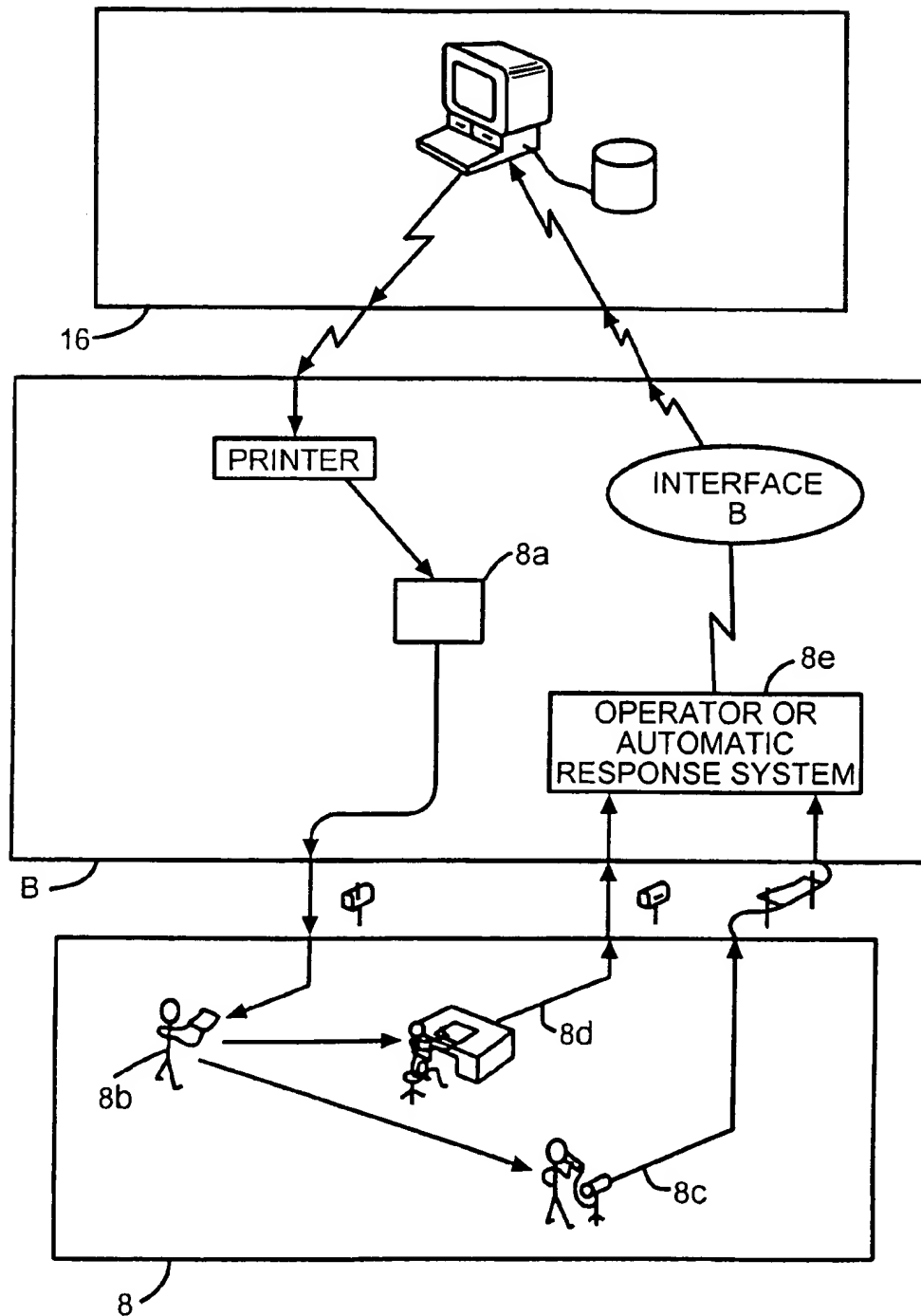


FIG. 8

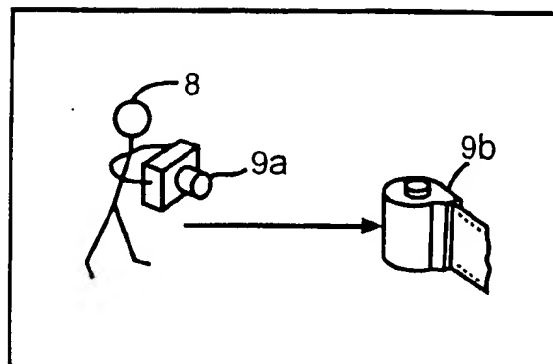


FIG. 9A

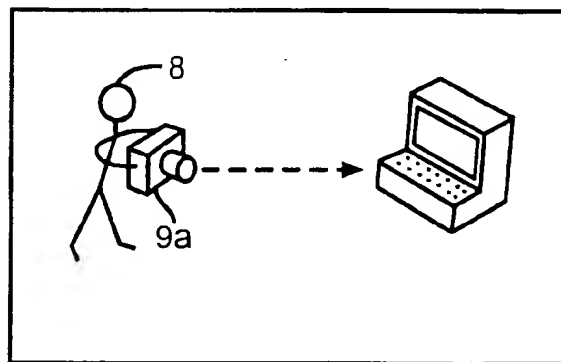


FIG. 9B

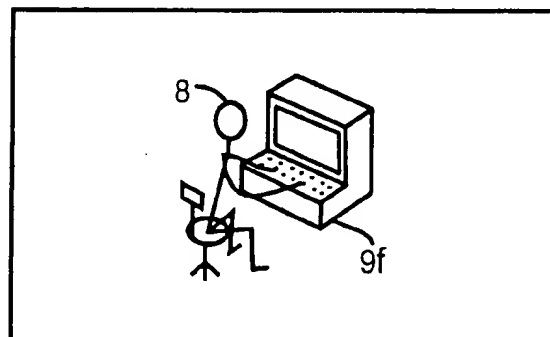


FIG. 9C

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METHOD OF PROCESSING DIGITAL IMAGES AND DISTRIBUTING VISUAL PRINTS PRODUCED FROM THE DIGITAL IMAGES

FIELD OF THE INVENTION

This invention relates to a method of processing digital images of at least one photographic image and distributing visual prints produced from the digital images. More particularly, this invention relates to a method of processing at least one digital image of at least one photographic image and distributing visual prints in various formats corresponding to the at least one digital image.

BACKGROUND OF THE INVENTION

In a common photographic process, a series of photographic prints are taken with a camera and the exposed film is sent to a photographic laboratory where the film is developed. In the developing process, the exposed film is transferred in darkness into a developing solution, which causes any affected grain of the latent image to be wholly converted into silver. After a brief rinse in a stop bath of acid or water to remove developer and to stop development, the film is fixed in a solution of sodium thiosulfate or in a more rapid fixing solution. These solutions dissolve and remove the unchanged silver salts, thus rendering the film insensitive to light. The film is then washed and dried. Each picture is now a transparent negative in which light parts of the object are represented by dark areas and dark parts by light areas.

A large negative can be used to make a contact print, but small negatives are usually placed in an enlarger in which light from a lamp throws an enlarged and accurately focused image onto a piece of printing paper that has been coated with an emulsion similar to that on the film but less sensitive to light. The paper is then developed and fixed to form a positive print. The developed photographic prints are then provided to the photographer.

Although the photographic process of developing and distributing photographic prints has proven satisfactory, further improvements in the field of processing and distributing photographic film are desired. An object of the present invention is to provide a method of processing digital images of at least one photographic image and distributing visual prints produced from the digital images. Yet another object of the present invention is to provide a method of processing digital images of at least one photographic image and distributing visual prints through the use of an interface such as an HTML interface, client interface, or received via a telephone operator or printed order. Still another object of the present invention is to provide a method of processing digital images of at least one photographic image and distributing visual prints that is economical and easily accessible through a secure network.

SUMMARY OF THE INVENTION

This invention is directed to a method of processing at least one digital image of at least one photographic image and distributing at least one visual print produced from the at least one digital image. The method includes the steps of storing at least one digital image of at least one photographic image on at least one image server at a first location. Selective authorized access to the at least one digital image of the at least one photographic image from a second location is then facilitated. Orders are received for at least

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one visual print of the at least one photographic image from the second location. Based upon the orders at least one visual image is produced from the stored digital image at the first location in response to the at least one order.

The at least one digital image of at least one photographic image may be acquired from exposed photographic film or from a digital camera.

DESCRIPTION OF THE DRAWINGS

Further features and other objects and advantages of this invention will become clear from the following detailed description made with reference to the drawings in which:

FIG. 1 is a drawing illustrating the invention methodology of processing digital images of at least one photographic image and distributing visual prints produced from the digital images.

FIG. 2 is an illustration of a Developer and Scanning Center;

FIG. 3 is a schematic of the upload interface A between the scanning center and the image server of FIG. 1;

FIGS. 3A-3B are a schematic of the processing of images ill the upload interface A;

FIGS. 4 is a schematic of the upload interface A from the Photographer to the image server;

FIGS. 5-5F are a schematic of the Interface B;

FIG. 6 is an illustration of a Fulfillment Center;

FIG. 7-7A is a schematic of the Administrative Interface C;

FIG. 8 is an illustration of an alternate Interface B between the Photographer and the Image Server; and

FIGS. 9A-9C are representative illustrations of a Photographer.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing wherein like reference characters represent like elements, the invention is illustrated in FIGS. 1-7A as a method 10 of processing digital images of at least one photographic image and distributing visual prints in various formats corresponding to the at least one digital image of the at least one photographic image.

Briefly, referring to FIGS. 9A and 9B, the illustrated methodology 10 is used in association with a conventional photographic process wherein an object(s) or subject(s) are posed in front of a camera 9a and one or more pictures are taken of the object(s) or subject(s) by a photographer 8 utilizing the camera. The camera may be a conventional camera 9a using photographic film or a digital camera of a type well known in the art.

When using photographic film 9b, the exposed photographic film is then sent to a developer 12, e.g., a photographic laboratory, where the photographic film is developed in the traditional manner as well known in the photographic industry, see FIG. 2. The developed photographic film is then scanned at a scanning center 14 to acquire a digital image of the photographic image on the photographic film, see FIG. 2 and stored on one or more image servers 16. In an alternate embodiment, a digital image from the digital camera of the photographic image is uploaded directly to one or more image servers 16, see FIG. 9B.

Selective authorized access to an image of the photographic image is then provided through an interface B as further described herein. Orders for visual prints in various

formats corresponding to the photographic image are then received and fulfilled from a fulfillment center 20 also as further described herein.

The establishment which receives the roll of film for development will be referred to herein as the "developer" 12. The developer 12 may only act as an intermediary between the photographer 8 and the entity that actually develops the roll of film or the developer may actually develop the roll of film. As used herein, the "photographer" refers to any party having authorized access to the images and is not necessarily limited to the party that took the pictures. The establishment which scans the roll of film and sends (or uploads) it to the image server 16 will be referred to herein as the "scanning center" 14. The establishment which fulfills, charges, and delivers the order will be referred to herein as the "fulfillment center" 20. The developer 12 and/or the scanning center 14 and/or the fulfillment center 20 can be at the same physical location and may be the same entity.

In accordance with one embodiment of the present invention, in the development process either a negative strip 9c (cut or uncut) is generated and marked for digital processing or a series of developed photographic prints is made at the photographic laboratory from the roll of film and sent to the scanning center 14. At the scanning center 14, the developed photographic prints and/or negative strips are then converted into digital images. The developed photographic prints and/or negative strips are converted into digital images by a scanner 9d of a type well known in the art. For example, digital images may be scanned from a negative strip on a negative scanner or from developed photographic prints on a flatbed scanner.

In a preferred embodiment, scanning occurs from the negative before the negative strip is cut. The negative is preferably scanned after the photographic film is developed and before any photographic prints are created. In a most preferred embodiment, all photographic images in the negative strip are scanned in a single pass by the scanner 9d. In an alternate embodiment, the negative strips are spliced together on a film reel 9e in a manner well known in the photographic industry, and the rolls are scanned automatically by a high-volume commercially available scanner 9d. Developed photographic prints may be scanned on a flatbed scanner (a typical set of prints from a roll can be scanned in about 10–20 minutes). Regardless of the method used to acquire the digital image, the preferred minimum size for the resulting image is 1024×1536 pixels with 24-bit color. It will be appreciated that color and exposure correction of the digital image may be performed after scanning using techniques well known in the art.

In an alternate embodiment, the digital images may be acquired through the photographer 8 by scanning or acquired directly from a digital camera of a type well known in the art.

The acquired digital images are then transferred electronically to one or more machines at a first location, e.g., computers, for storage as well known in the art. (see e.g., 3a, FIG. 3). As shown in FIG. 1, the digital images may be transferred by the photographer 8 and/or the scanning center 14 through an upload interface A.

A machine useful for storing the digital images will be referred to herein as an "image server." In a preferred embodiment, the digital images are stored at a first location on one or more image servers 16 from which images are accessible by the photographer 8 through the use of an interface B. In a most preferred embodiment, each digital

image is scanned in JPEG format and stored in a computer database on one or more image servers 16. For example, the individual digital images may be stored in a single directory on each image server 16, with database entries identifying the location of the digital images and any related information. Since the digital images may be stored on numerous image servers 16 as desired, a unique access code is provided that incorporates an identifier which identifies the location of the image server 16 where the digital images are stored. (see e.g., 3d, FIG. 3). In a preferred embodiment, the access code includes a prefix which identifies the digital images of interest and the particular image server 16 storing the digital images. (see e.g., 3c and 3d, FIG. 3, and 5c, FIG. 5). The access code may be selected by the scanner operator for each roll of film, based upon a desired set of criteria. For batch scanning of rolls of film, the access code may be selected based upon a pre-assigned number for the batch and a bar code associated with the roll of film which is automatically detected by the scanner during the scanning process.

In a preferred embodiment, the digital images and associated information are stored in a single directory on a local machine of the photographer 8 or at the scanning center 14. An operator at the scanning center or the photographer 8 uses the upload interface A to transfer the data (all images and associated information) to the image server 16, where it is stored in a directory on the image server. In a preferred embodiment, a Graphical User Interface (GUI) is used to verify the quality and orientation of the digital images before sending them to the image server 16. (see e.g., 3b, FIG. 3). The digital images and information are then processed at the image server 16 and incorporated into the image server database. (see e.g., 3f, FIG. 3).

It will be appreciated that this design allows for communication between the scanning center 14 or photographer 8 and the image server 16 to be interrupted at any time without causing a failure, since the digital images are not processed until the entire roll is stored at the image server. A partially uploaded roll of film may be deleted or the uploaded digital images re-used (if they are the correct size and have an identical checksum as the corresponding images at the scanning center 14).

In a most preferred embodiment, the image server 16 is at the same physical location as the scanning center 14, which allows a local network between the local machine and the image server to transfer images in an efficient manner via the upload interface A.

Preferably, the image server 16 stores the digital images in a commercially available database on a RAID disk partition to guard against disk failures, and the server data is archived on an archival medium (such as an 8 mm. tape drive) at regular intervals to guard against catastrophic failures.

Selective authorized access to an image of the developed film is then provided through the use of the interface B.

As previously described, a unique access code is associated with the digital images to facilitate secure viewing of the images from a separate second location through the use of the interface B. In addition to the access code, a name, phone number, e-mail address, store location (where the film was received), scanning location (where the digital images were created), current date and time, and other desired information may be assigned and/or collected for each roll of film. This information is transferred to the image server 16 through the upload interface A along with the digital images. (see e.g., 3e, FIG. 3).

Asynchronous

Archiving

In a preferred embodiment, an access code is associated with each roll of film 9b, and the digital images are accessed at the image server 16 through the use of the interface B by HyperText Markup Language (HTML) pages on the WWW (World Wide Web) or a client interface accessing an image server using a proprietary protocol over a computer network such as the Internet. Examples of a client interface include a plug-in module for the well-known Adobe Photoshop or a stand-alone imaging application specially designed for this purpose.

In a most preferred embodiment, the photographer 8 accesses HTML pages from a WWW browser using either the Secure HyperText Transport Protocol (HTTPS) or HyperText Transport Protocol (HTTP) to access a Netscape Enterprise Server running on an Axil 320 Sparc acting as the image server. The Netscape server is configured with an HTML forms interface which accepts the unique access code and provides access to thumbnails (small replicas of the full digital image) of the images in the roll in the form of an online proof sheet. The interface B allows the photographer 8 to perform specific tasks using the digital images, such as the ability to electronically mail (e-mail) an image to another party; download an image to the photographer's home computer 9f, see FIG. 9C; or order a visual print of a specific image in a variety of formats and sizes, such as photographic prints or enlargements of photographic prints, and photographic merchandise including T-shirts, sweatshirts, mugs, mouse pads, puzzles, ties, buttons, electronic slide shows, and other items bearing the digital image.

It will be appreciated that when downloading or e-mailing a digital image, the resolution of the digital image is preferably reduced to a screen size of 600x400 pixels or 712x512 pixels. These sizes are more appropriate for screen display of the digital images, and allow faster transfer of the data over a network.

In a preferred embodiment, the image server 16 is connected to the Internet to allow the processed digital images to be accessed from remote locations (second location) different from and independent of where the film is developed (first location). The digital images for a roll of film are maintained at the image server 16 for a fixed period of time (such as 30 days), after which they are marked as deleted and, after a short grace period (such as 5 days), removed from the image server to free up disk space for other images. The grace period allows for fulfillment of orders which occur after a roll is marked deleted to be handled from the image server 16, since the roll is still on the image server (avoiding the need to reference a backup copy of the roll). In this embodiment, multiple RAID partitions are preferably used so that the image server 16 can continue to process new rolls of film when one partition is unavailable due to service or backup procedures as well known in the art. While a number of solutions exist for storing the digital image files for a particular roll in the RAID partitions, the process described below satisfies several important performance considerations, and is currently preferred. This process selects a directory on the image server 16 for storage of the digital images, and assumes that this location is stored along with the related roll information (e.g., access code, name, etc.) in a database (with the access code serving as the primary index). The process for choosing a directory is as follows:

- a) A directory called RAID is used, under which a directory exists for each file system partition (such as aux1, aux2, etc. up to 365 maximum partitions). Partitions are large enough to store a large number of rolls (generally 12–15 Megabytes per roll) but small enough

to be backed up to a single tape (with 8 mm. tapes, roughly 7 Gigabytes per partition). (see e.g., 3g and 3k, FIG. 3A). A partition directory is chosen by taking the number of partitions modulo the day of the year.

- b) The preferred Axil machine runs the Solaris operating system (a version of UNIX) and can be configured to run multiple image servers (by responding to multiple IP addresses, such as www.photonet.com, wolf.photonet.com, etc.). To allow for this situation, each partition directory contains a subdirectory for each such site (for example, www, wolf, etc.). (see e.g., ej, FIG. 3A). This allows multiple sites to share a single RAID directory tree.
- c) If the site directory has a file called "FULL" in it, then the partition is considered unavailable and is not used. (see e.g., 3l, FIG. 3A). If a FULL directory is encountered, then the next numeric RAID partition is used instead (wrapping back to the first directory if necessary). (see e.g., 3o, FIG. 3A). If all directories are full, then the roll processing fails and the roll is not stored in the database or available to the photographer. (see e.g., 3n, FIG. 3A).
- d) Under the site directory are a number of directories (such as "1," "2," etc. up to 365 maximum directories). This number must be relatively prime with respect to the number of RAID partitions available. (That is, the divisors of one number cannot be divisors of the other. The easiest way to accomplish this is if both numbers are prime.) (see e.g., 3i, FIG. 3A). The image server takes the number of directories modulo the day of the year to determine which numeric directory to use. Determining directories based on the day of the year ensures that rolls of film processed on the same day will generally appear in the same directory. (see e.g., 3mm FIG. 3B).
- e) Each numeric directory can store up to 255 rolls of film, since the UNIX file system is most efficient with no more than 255 files in a directory. (see e.g., ep, FIG. 3B). If a numeric directory is full, the next numeric directory is used (wrapping back to "1" if necessary). If all numeric directories are full, the next numeric partition directory is used, as in step C above. (see e.g., 3u, FIG. 3B).
- f) A directory with a name identical to the roll's access code is created under the calculated numeric directory. (see e.g., 3q, FIG. 3B). Each image in the roll is stored as a separate file in this directory. (see e.g., 3r, FIG. 3B).

Note that the foregoing procedure is only used to determine the location of the digital images. (see e.g., 3s, FIG. 3B). After the location has been determined, the database entry for the digital images contains the digital images location. All future access to the digital images is performed via the database entry for the digital images.

As previously mentioned, the preferred HTML interface allows the photographer to view thumbnails of the digital images. The preferred thumbnail sizes are 16-bit true color images with resolutions of 50x34 pixels, 64x43 pixels, 96x64 pixels, and 160x107 pixels. The thumbnail digital images can be generated when the film is originally processed (the preferred method) or on-the-fly when the thumbnail digital images are requested by a photographer 8. In either case, the thumbnail digital images are cached at the image server 16 in a special directory reserved for this purpose. (see e.g., ei, FIG. 3B). Subsequent access to the thumbnail digital images may be obtained by retrieving

them directly from this cache. Thumbnail digital images in the cache can be deleted as required, and regenerated as needed.

In a most preferred interface, a photographer 8 accesses the image server 16 from a remote second location in order to view an HTML page containing the thumbnail digital images. (see e.g., 5a and 5e, FIG. 5). If the photographer selects a particular thumbnail digital image, a larger version of that digital image is then displayed on a new HTML page. This later page also contains a procedure for allowing the photographer 8 to view the next or previous digital image, perform electronic transactions with the digital image (such as downloading the digital image to a local computer or e-mailing the digital image to another party), or order visual prints of the digital images in a variety of formats and sizes. (see e.g., 5f and 5p, FIG. 5B and FIG. 5C).

The photographer 8 can request that a copy of a digital image be downloaded (or sent) to a local remote machine from the image server 16. (see e.g., 5g, FIG. 5B and 5q, FIG. 5F). Preferably, the photographer 8 obtains a high-resolution copy of the digital image (e.g., 1024x1536 pixels) in order to retain a high-quality digital image. The photographer a may generate a digital image of sufficient detail to order additional formats of the image based on the new digital image.

The photographer 8 may also generate a new digital image based on the original digital image. The new digital image may incorporate changes or modifications over the original digital image such as modifying the color or exposure attributes of the digital image, merging data from multiple digital images into a single new digital image, or other standard image generation techniques available in applications such as Adobe Photoshop and the like. The new digital image is then sent to the image server 16. (see e.g., 4a, FIG. 4). If desired, the new digital image may replace the original copy of the digital image at the image server 16, be added to the set of digital images available under the unique access code previously assigned, added under a new access code or added to a different preexisting access code. (see e.g., 4b and 4d, FIG. 4). In any case, the new digital image may also be available at the image server 16 and all interfaces B are available to the photographer 8 to view this digital image.

The photographer 8 can use the interface B consisting of the HTML interface to step forward or backward through the digital images in the roll, and each digital image may be viewed, downloaded, e-mailed (electronically mailed), or special ordered as a visual print. (see e.g., 5d, FIG. 5A). It will be understood that the HTML interface is utilized by the photographer 8 in the sales process to determine which of the digital images (if any) the photographer would like to order as a visual print as well as the sizes, types, and number of visual prints to be ordered. (see e.g., 5j, FIG. 5D).

As previously explained, the visual prints include photographic paper prints or items incorporating the digital image such as mugs, T-shirts, or other items. When placing an order, the photographer 8 may also be aided by digital image replicas of the various products that they can choose to order. Selecting a product replica initiates an ordering procedure for the selected product incorporating the selected digital image.

Each image server 16 maintains a table of access code prefixes and associated image servers, which is used to automatically forward requests for digital images to the appropriate image server. (see e.g., 5b, FIG. 5). For HTML access to the image server 16, forwarding can be performed by returning a reference to an HTML page located at the remote server (second location).

For client interface access to the image server 16, the client can determine the appropriate image server to contact by making a remote procedure call to the known server. (see e.g., 4c, FIG. 4). Accordingly, a large number of geographically distributed image servers 16 are able to manage any number of digital images for a large number of geographically distributed photographers 8.

In an alternate embodiment to the interface over a computer network, the interface B is presented as a physical representation of the images which is delivered through the normal postal service or the like FIG. 8g. In this embodiment, the photographer 8 requests that one or more digital images be made available to a specified recipient. The requested digital images are placed on an index print 8a, which is a small physical representation of each digital image together on a single print (much like the proof sheet or set of thumbnails, but as a printed photograph rather than on a computer screen). The index print 8a is assigned a unique access code and each image in the print is marked with a different number.

The index print 8a is then sent to the desired recipient 8b along with instructions for ordering photographic merchandise based on the delivered images. In a preferred embodiment, a toll-free number is provided, which the recipient 8b can immediately call 8c and place an order for a visual print based on any printed photograph in the index print. In an alternate embodiment, an order form can be included with the index print, which the recipient can fill out and return to place an order 8d. For the toll-free telephone number, the order may be placed with a human operator or an automated response system 8e of a type commercially available. A human operator may utilize an interface similar to the HTML interface previously described above. However, the operator accesses the digital images on the image server 16 using the unique access code provided by the caller. Otherwise, the types of screens, items to order and information collected are similar to the HTML interface previously described.

It will be appreciated that the image server 16 may receive rolls of film from a variety of developers 12, e.g., film development companies, portrait studios, development warehouses, individual camera shops and the like. These companies may desire to maintain control over the products offered for their rolls (that is, rolls from their photographers which are scanned into digital images and uploaded to the image server 16) and the prices of these products. Moreover, it will be appreciated that the larger development warehouses in turn service numerous drugstore, grocery store, and other establishments, which also wish to maintain control of their offerings. The preferred method for supporting this functionality is to individually control each interface B by assigning each company an administrative account and password which is used while uploading a roll of film. This administrative account has access to one or more price sheets at the image server 16 uniquely associated with that account. Each price sheet is a table of products to offer and the prices for these products. The scanning center 14 assigns a price sheet for each roll of film when that roll is uploaded to the image server 16. The image server 16 uses this price sheet to display to the photographer 8 the products which may be ordered from their images and the price of each product. (see e.g., 5h, FIG. 5D). This method allows the developer 12, e.g., original retail outlet (such as a drugstore) that accepts the roll of film (which is eventually made available from the image server), to control the products and pricing seen by the photographer 8 in the HTML interface or other interface B at a remote second location. (see e.g., 5i, FIG. 5D).

When the photographer 8 uploads one or more digital images directly to the image server 16, these images are either added to a set of images already associated with an access code or the new images are assigned a new unique access code. When a new access code is assigned, a price sheet must be associated with these images in order to provide to the photographer 8 the visual prints which may be ordered using the new images. In a preferred embodiment, the photographer 8 selects a fulfillment center 20 which they prefer to use to fulfill all orders placed using the new images. A price sheet is associated with each fulfillment center 20, and this price sheet forms the basis for the products available to the photographer 8, and the prices of these products.

The fulfillment center 20 receives orders placed through the interface B, e.g., HTML interface, client interface, or received via a telephone operator or written order based on an index print as previously described. (see e.g., 50, FIG. 5E and 7e, FIG. 7A). Once an order has been placed, regardless of the interface B employed, the order is fulfilled and delivered. From the fulfillment center 20 perspective, an order off an index print is no different than an order received over any of the other interfaces B. The visual prints are generated from the stored digital image, and the order is delivered to a specified location using techniques well known in the art. (see e.g., 5k, FIG. 5D).

When an order is placed for a visual print, the photographer 8 provides the appropriate billing and shipping information and this information is stored on the image server 16. (see e.g., 5l, FIG. 5D and 5n, FIG. 5E). In a preferred embodiment, the order may be charged to the photographer's credit card and delivered by standard mail to the photographer 8 at a specified address. (see e.g., 5o, FIG. 5E). In this case, shipping charges are usually assessed in addition to the product charges. In an alternate embodiment, the order may be delivered to a retail outlet, e.g., developer 12, and picked up by the photographer 8. (see e.g., 5m, FIG. 5E). In this case, the photographer 8 may use any method of payment accepted by the retail outlet, the credit card number of the party placing the order is preferably obtained by the image server 16 as a guarantee for the order.

In a most preferred embodiment, the image server 16 also provides an HTML-based administrative interface C which is accessible by the developer 12, the scanning center 14, the fulfillment center 20, and other appropriate parties. The interface C is accessed using an account and password unique to the party, and the capabilities a particular account can perform is limited by an access control list in a manner well known in the art. (see e.g., 7a, 7b, 7c, FIG. 7). Available capabilities include, but are not limited to, the ability to upload new rolls to the image server 16; view, edit, or delete rolls of film (that is, the images and information associated with the roll); view or edit charges associated with a roll of film; create or edit price sheets; view, edit, or fulfill orders; generate and print activity reports based on various criteria; and view or edit system administrators for the image server. (see e.g., 7d, FIG. 7). It will be appreciated that the individual capabilities may also be split between multiple interfaces. In order to support these capabilities, the image server 16 maintains multiple databases containing roll, user, price sheet and other administrative information, as well as tracking usage data for all activities performed on the image server. (see e.g., 7f and 7i, FIG. 7A). In addition, the image server 16 also maintains a disbursement sheet associated with each price sheet. (see e.g., 7g, FIG. 7A). The disbursement sheet identifies how any profits obtained from the orders are shared between the developer 12, the scanning

center 14, the fulfillment center 20, and any other party. (see e.g., 7h, FIG. 7A). The preferred method for these disbursements are as a percentage of the net margins. Furthermore, the disbursements for a particular party may be further disbursed to additional parties. For example, a party may sponsor a promotion for the sale of a visual print such as mugs in exchange for 10% of the fulfillment center's share of profits.

The creation of the visual prints from the digital image is performed using standard equipment available in the industry. In a preferred embodiment, a film recorder 6a, see FIG. 6 such as an Opal recorder from Management Graphics, Inc. is used to generate a photographic negative from the digital image. The negative 6b is then used to generate a visual print 6c which is identical to the digital image on the appropriate merchandise. In an alternate embodiment, a cathode ray tube printer 6d such as those available from Konica USA or Bremson Inc. creates the visual prints on photographic paper directly from the digital image. It will be appreciated that this avoids the cost of creating a negative, while still preserving the quality of a photographic print. For non-paper items such as mugs 6f or T-shirts 6g, the visual print 6c can be printed directly from the digital image, and adhered to an item using a heat transfer system 6e of a type well known in the art. In yet another embodiment, an alternate photographic printing method can be used, such as the Pictography 3000 system available from FujiFilm.

The patent applications, patents and documents referred to herein are hereby incorporated by reference.

Having described presently preferred embodiments of the invention, it may be otherwise embodied within the scope of the following claims.

What is claimed is:

1. A method of processing a roll of exposed photographic film containing photographic images into corresponding digital images and then selectively distributing visual prints produced from the digital images comprising the steps of:

receiving a roll of exposed photographic film containing photographic images; scanning the roll of exposed photographic film to acquire digital images corresponding to the photographic images contained on the roll of exposed photographic film;

assigning an authorization code to the digital images; storing the digital images and the assigned authorization code on at least one image server at a first location; facilitating selective authorized access using the authorization code from a second location to the digital images stored at the first location;

receiving at least one order at the at least one image server for at least one visual print corresponding to at least one of the stored digital images from the second location; producing the at least one visual print; and distributing the at least one visual print.

2. The method of claim 1 wherein selective authorized access is provided through an interface by associating an access code with the digital images to allow only authorized access to the digital images from a second location in order to view the digital images.

3. The method of claim 2 wherein the access code is based upon a preassigned number for the exposed photographic film and a bar code associated with the exposed photographic film.

4. The method of claim 2 wherein the access code includes an identifier which indicates the location of the at least one image server where the at least one image is stored.

5. The method of claim 1 further comprising the steps of:

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providing exposed photographic film including at least one photographic image; and

developing the at least one photographic image.

6. The method of claim 5 wherein the at least one digital image is acquired at a different location than the at least one photographic image is developed.

7. The method of claim 5 wherein the at least one visual print is produced at a different location than the at least one photographic image is developed.

8. The method of claim 5 wherein the at least one digital image is accessed and at least one visual print ordered from multiple locations.

9. The method of claim 2 wherein the interface is a physical representation of the at least one image which is delivered to a specified recipient.

10. The method of claim 9 wherein the physical representation is an index print.

11. The method of claim 10 wherein the index print is assigned a code and each image in the index print is marked with a different number.

12. The method of claim 1 wherein the at least one image is accessed at the at least one image server through an interface from a second location in order to view the at least one image.

13. The method of claim 12 wherein the at least one order is received by a fulfillment center through the interface.

14. The method of claim 12 wherein the interface is an electronic medium.

15. The method of claim 14 wherein the electronic medium is a computer network.

16. The method of claim 12 wherein the interface comprises a client interface over a computer network.

17. The method of claim 12 wherein the interface is HyperText Markup Language (HTML) pages on the WWW (World Wide Web).

18. The method of claim 12 wherein the interface accepts the access code and provides access to digital images at the image server.

19. The method of claim 12 wherein the interface facilitates electronic transfer of the digital image.

20. The method of claim 12 wherein the interface facilitates ordering at least one visual print in a variety of formats and sizes.

21. The method of claim 20 wherein the formats include photographic prints, enlargements and merchandise.

22. The method of claim 1 wherein the step of scanning includes scanning a negative strip.

23. The method of claim 1 wherein the step of scanning includes scanning at least one developed photographic print.

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24. The method of claim 1 wherein at least one image server is at least one computer and each digital image is stored in a computer database on at least one computer.

25. The method of claim 1 wherein the digital images are maintained at the at least one image server for a fixed period of time.

26. The method of claim 2 further comprising the step of associating with at least one digital image product and pricing information.

27. The method of claim 26 wherein an administrative account and password is required in order to receive the at least one order.

28. The method of claim 26 wherein the access code facilitates access to a price sheet at the at least one image server associated with the at least one digital image.

29. The method of claim 28 wherein each price sheet includes a table of products to offer and the prices for the products.

30. The method of claim 29 wherein when the at least one order is received the at least one image server collects billing and shipping information.

31. The method of claim 1 wherein the at least one image server includes an administrative interface accessible by an account number and a password.

32. The method of claim 31 wherein the administrative interface permits access to data pertaining to all activities performed on the at least one image server.

33. The method of claim 31 wherein the at least one image server includes a disbursement sheet identifying how profits obtained from the at least one order are distributed.

34. The method of claim 1 wherein the at least one visual print is produced from the at least one digital image using a film recorder.

35. The method of claim 1 wherein the at least one visual print is produced by generating a photographic negative from the digital image and then using the photographic negative to generate a visual print which is identical to the digital image.

36. The method of claim 1 wherein the at least one visual print is produced by printing an image directly from the digital image and then adhering the image to an item using a heat transfer system.

37. The method of claim 1 wherein the at least one acquired digital image on at least one image server at a first location is modified and then stored.

38. The method of claim 1 further comprising the step of verifying the quality and orientation of the digital images and then collectively transmitting the digital images to at least one image server at a first location.

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